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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/033,646	12/27/2001	Kenji Yamagami	36992.00089 (HAL 198)	7987
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SQUIRE, SANDERS & DEMPSEY L.L.P 600 HANSEN WAY PALO ALTO, CA 94304-1043			INOA, MIDYS	
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			2189	

DATE MAILED: 04/15/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No.	Applicant(s)
	10/033,646	YAMAGAMI, KENJI
	Examiner Midys Inoa	Art Unit 2189

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM  
THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

1) Responsive to communication(s) filed on 27 December 2004.  
 2a) This action is FINAL. 2b) This action is non-final.  
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

4) Claim(s) 1-21 is/are pending in the application.  
 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
 5) Claim(s) \_\_\_\_\_ is/are allowed.  
 6) Claim(s) 1-21 is/are rejected.  
 7) Claim(s) \_\_\_\_\_ is/are objected to.  
 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

9) The specification is objected to by the Examiner.  
 10) The drawing(s) filed on 27 December 2001 is/are: a) accepted or b) objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) All b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

1) <input type="checkbox"/> Notice of References Cited (PTO-892)	4) <input type="checkbox"/> Interview Summary (PTO-413)
2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)	Paper No(s)/Mail Date. _____
3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____	5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)
	6) <input type="checkbox"/> Other: _____

## **DETAILED ACTION**

### ***Response to Arguments***

1. Applicant's arguments filed on December 27<sup>th</sup>, 2004 have been fully considered but they are not persuasive.

Regarding independent claims 1, 11, 14, and 21, applicant argues that “master daemons 24 and 30 do not mirror logical group 0 and logical group 1 … [since] Figure 5 does not show a connecting line between logical groups 0 and 1… evidencing only remote mirroring” (see Page 9 of response). However, the relationship between the first and third logical volumes as well as the second and fourth logical volumes is described by Wahl as “local data mirroring” which is used to protect data at a local level and which can be provided in a system in addition to remote data mirroring (see Col. 1, line 26-65).

Additionally, in response to Wahl stating that “the computer network remote data mirroring system 10 supports up to 512 logical groups…” applicant argues that “applicant finds it hard to believe that Wahl intended to have 512 logical groups locally mirrored – such redundant would be unnecessary and impractical…” However, although Wahl does mention that one implementation of his invention supports **up to 512** logical groups, this fact does not mean that 512 logical groups must be present in all implementations of his invention. The invention can be implemented with less logical groups, in which case the local mirroring techniques described by Wahl (see Col. 1, line 26-65) could be efficiently implemented in combination to the described remote mirroring techniques of his invention.

Regarding Claims 9-10, applicant argues that the Prior Art of record does not teach local mirror connections. However, the relationship between the first and third logical volumes as

well as the second and fourth logical volumes is described by Wahl as “local data mirroring” which is used to protect data at a local level and which can be provided in a system in addition to remote data mirroring (see Col. 1, line 26-65).

***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-6, 8, 11-17, and 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wahl et al. (6,324,654) in view of Blumenau (6,631,442).

Regarding Claims 1, 11, 14, 19, and 20-21, Wahl et al. (6,324,654) discloses a method for making a remote copy between a first storage subsystem (primary system 12) and a second storage subsystem (primary system 14, see Figure 5) which are connected to each other via a path (LAN/WAN 20, Figure 1), the first storage system connected to a first host (processor of the first computer system 12), the method comprising the steps of:

providing a first logical volume to the first storage subsystem (Primary system 12, Logical Group 0) and a second logical volume to the second storage subsystem (Primary system 14, Logical Group 0),

the second logical volume being a copied logical volume of the first logical volume through the use of mirror daemons 24A and 30A, the first logical volume and the second logical volume being in sync state through data links shown in Figure 5,

making a third logical volume in the first storage subsystem (Primary system 12, Logical Group 1), the third logical volume being a copied logical volume of the first logical volume where the copying is supervised by master mirror daemon 30, the first logical volume and the third logical volume being in sync state through Master Mirror daemon 30,

making a fourth logical volume in the second storage subsystem (Primary system 14, Logical Group 1), the fourth logical volume being a copied logical volume of the second logical volume where the copying is supervised by master remote mirror daemon 30, the second logical volume and the fourth logical volume being in sync state through Master Mirror daemon 30.

The fourth and third logical volumes (Logical groups 1) are synchronized through data links shown in figure 5 (Column 11, lines 44-67).

The relationship between the first and third logical volumes as well as the second and fourth logical volumes is described by Wahl as “local data mirroring” which is used to protect data at a local level and which can be provided in a system in addition to remote data mirroring (see Col. 1, line 26-65).

Although Wahl does mention that one implementation of his invention supports **up to** 512 logical groups, this fact does not mean that 512 logical groups must be present. The invention can be implemented with less logical groups, in which case the local mirroring techniques described by Wahl could be efficiently implemented in combination to the described remote mirroring techniques of his invention.

Wahl et al. does not disclose breaking the sync state between the first logical volume and the third logical volume and between the second logical volume and the fourth logical volume.

Blumenau (6,631,442) discloses disassociating storage space from storage system (abstract and Column 4, lines 13-19).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to disassociate the fourth and third logical volumes from the first and second logical volumes, while keeping their existing association to each other since doing this would allow the existing system to not be affected by changes occurring to the disassociated volumes due to separate testing and processing operations.

Regarding Claim 2, Wahl in view of Blumenau discloses the method of claim 1, further comprising: providing a first auxiliary host at the first storage subsystem (processor part of primary system 12), the first auxiliary host having permissions to access the third logical volume (Logical group 1 of primary system 12); providing a second auxiliary host at the second storage subsystem (processor part of primary system 14), the second auxiliary host having permissions to access the fourth logical volume (Logical group 1 of primary system 14); and executing applications using the first auxiliary host, the second auxiliary host, the third logical volume and the fourth logical volume where such operation includes using the mirror daemons to process data replication from one logical volume to the other (Column 11, lines 50-67).

Regarding Claims 3, 4, and 15, Wahl in view of Blumenau discloses the method of claims 2 and 14, wherein executing applications comprises performing data recovery, and making a third logical volume in the first storage subsystem comprises storing a copy of data used by the first host on the third logical volume, and making a fourth logical volume in the second storage subsystem comprises forming a mirror image of data in the third logical volume on the fourth volume (Column 23, lines 30-43). In having a data recovery system implemented

in the mirroring system of the invention, testing the recovery system periodically would involve performing the recovery procedure using test data. Furthermore, a data recovery test would have to include a simulation of a disaster at the primary storage system 12; and testing backup of information from the third logical volume to the fourth logical volume, and recovery there from, as it would be done in a real situation.

Regarding Claims 5, 6, and 16, Wahl in view of Blumenau discloses the method of claims 2 and 14, wherein executing applications comprises performing data mining, where data mining comprises: establishing a data warehouse having a copy of on line transaction processing data at the first auxiliary host (primary system); and performing data analyses on the data warehouse information (authentication handshake... verify configuration file... Column 11, lines 14-31), and performing backups and/or recovery of the data warehouse information of the third logical volume to the fourth logical volume (...commits data updates to the mirror device); and making a third logical volume in the first storage subsystem comprises establishing on the third volume a data warehouse having a copy of on line transactions processing data used by the first host wherein the copying from one logical group to the other is maintained by the master mirror daemon 30, and making a fourth logical volume in the second storage subsystem comprises forming a mirror image of data in the third logical volume on the fourth volume, where the mirroring is controller by mirror daemons 24B and 30B (See Figure 5, Column 11, line 44-line 67).

Regarding Claims 8 and 17, Wahl in view of Blumenau discloses the method of claims 1 and 14, wherein synchronizing the fourth logical volume with the third logical volume comprises: issuing a command to form a mirror with a no copy option ("...feeds data over the

network 20 in the same order in which it is stored on the remote mirror in the secondary computer system"); and creating a new copy management storage area for the mirror (write log 18 keeps track of current updates). Please see Column 10, lines 1-25.

Regarding Claim 12, Wahl in view of Blumenau disclose the apparatus of claim 11, further comprising: a means for creating an atomic split command, the command comprising: an identity of a first means for storing data to serve as a primary volume (primary computer system 12); and an identity of a second means for storing data to serve as a secondary volume (primary storage system 14, mirror devices 32). Identifying both of these volumes is done when attempting to perform a remote data mirroring operation and authenticating the connection between the volumes prior to starting the mirroring process.

Regarding Claim 13, Wahl in view of Blumenau disclose The apparatus of claim 11, further comprising: a means for creating an atomic split command, the command comprising: a first remote mirror (logical group 0, secondary system), comprised of the first means for storing data and the second means for storing data; a second remote mirror (logical group 1, secondary system), comprised of the third means for storing data and the fourth means for storing data; a first local mirror (logical group 0, primary system), comprised of the first means for storing data and the third means for storing data; and a second local mirror (logical group 1, primary system), comprised of the second means for storing data and the fourth means for storing data (figure 5).

4. Claims 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wahl et al. (6,324,654) in view of Blumenau (6,631,442) and further in view of Gotoh et al. (2003/0172286)

Regarding Claims 9 and 10, Wahl et al. discloses A computer readable storage medium having stored thereon an atomic split command, comprising:

a primary volume (Primary System 12, logical group 0, Figure 5), the primary volume having a local mirror connection with a primary mirror volume (Primary System 12, logical group 1, Figure 5); and

a secondary volume (Secondary System 14, logical group 0, Figure 5), the secondary volume having a local mirror connection with a secondary mirror volume (Secondary System 14, logical group 1, Figure 5);

the relationship between the volumes and their mirror volumes is described by Wahl as “local data mirroring” which is used to protect data at a local level and which can be provided in a system in addition to remote data mirroring (see Col. 1, line 26-65).

Wahl does not teach the atomic split command instructing the primary volume to remove the local mirror connection with the primary mirror volume and instructing the secondary volume to remove the local mirror connection with the secondary mirror volume.

Blumenau (6,631,442) discloses disassociating storage space from storage system (abstract and Column 4, lines 13-19).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to disassociate the fourth and third logical volumes from the first and second logical volumes, while keeping their existing association to each other since doing this would allow the existing system to not be affected by changes occurring to the disassociated volumes due to separate testing and processing operations.

Wahl in combination with Blumenau does not teach identifying the primary volume with an id indicating a primary volume (PVOL), and identifying the secondary volume with an id indicating a secondary volume (SVOL).

Gotoh et al. discloses using the serial number of a volume to identify the particular volume (paragraph 0317).

It would have been one of ordinary skill in the art at the time the invention was made to identify a particular volume using a volume's serial number as an id since serial numbers are unique to each volume and so, it would prevent the system from confusing the primary and secondary volumes.

5. Claims 7 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wahl et al. (6,324,654) in view of Blumenau (6,631,442) as applied to claims 1 and 14, and further in view of Kamvysselis et al. (6,496,908).

Regarding Claim 7, Wahl in view of Blumenau discloses the mirroring method of claim 1. Wahl in view of Blumenau does not teach determining if the sync state between the first logical volume and the second logical volume is an asynchronous mirror and if so:

inhibiting sending of further write data from the first storage subsystem to the second storage subsystem; recording incoming write data at the first storage subsystem; and re-synchronizing the first logical volume and the second logical volume after breaking the sync state between the second logical volume and the fourth logical volume.

Kamvysselis discloses determining if the sync state between the first logical volume and the second logical volume is an asynchronous mirror (Figure 4, #66) and if so:

inhibiting sending of further write data from the first storage subsystem to the second storage subsystem, where the inhibiting step comprises marking the data to be mirrored but not sending the data for mirroring; recording incoming write data at the first storage subsystem where the recording occurs at the queue of mirror requests (Figure 5, #76) and such queue holds

the marked data to be mirrored; and re-synchronizing the first logical volume and the second logical volume after breaking the sync state between the second logical volume and the fourth logical volume, where the re-synchronizing step occurs when all mirroring events, including those previously inhibited are completed (Figure 5, #84). Please see Column 7, lines 33-52).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the system of Wahl in view of Blumenau with the sync determination of Kamvysselis since doing so allows the system to differentiate between asynchronous and synchronous mirroring operations thus allowing for the prioritization of one mirroring technique over the other.

Regarding Claim 18, Wahl in view of Blumenau discloses the mirroring method of claim 14. Wahl in view of Blumenau does not teach determining if the sync state between the first logical volume and the second logical volume is an asynchronous mirror and if so:

copying all pending information to the second storage system.

Kamvysselis discloses determining if the sync state between the first logical volume and the second logical volume is an asynchronous mirror (figure 4, #66) and if so:

copying all pending information to the second storage system where the copying occurs after the data is marked for mirroring, queued for mirroring and finally, mirroring events are completed (see Figure 5).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the system of Wahl in view of Blumenau with the sync determination of Kamvysselis since doing so allows the system to differentiate between asynchronous and

synchronous mirroring operations and thus allowing for the prioritization of one mirroring technique over the other.

*Conclusion*

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Midys Inoa whose telephone number is (571) 272-4207. The examiner can normally be reached on M-F 5:30am - 4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mano Padmanabhan can be reached on (571) 272-4210. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

April 13, 2005

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